

Audit

Report



ACQUISITION OF THE SH-60R LIGHT AIRBORNE MULTIPURPOSE
SYSTEM MARK III BLOCK II UPGRADE

Report No. 99-075

February 2, 1999

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Acronym

C⁴I Command, Control, Communications, Computers, and Intelligence



INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202

February 2, 1999

MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY (FINANCIAL
MANAGEMENT AND COMPTROLLER)

SUBJECT: Audit Report on Acquisition of the SH-60R Light Airborne Multipurpose
System Mark III Block II Upgrade (Report No. 99-075)

We are providing this audit report for information and use. We considered Navy comments on a draft of this report in preparing this final report. The comments on the draft report conformed to the requirements of DoD Directive 7650.3 and left no unresolved issues. Therefore, we do not require additional comments.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. John E. Meling at (703) 604-9091 (DSN 664-9091) <jmeling@dodig.osd.mil> or Mr. Douglas P. Neville at (703) 604-9076 (DSN 664-9076) <dpneville@dodig.osd.mil>. See Appendix C for the report distribution. The audit team members are listed inside the back cover.

A handwritten signature in black ink, reading "Robert J. Lieberman", is positioned above the typed name.

Robert J. Lieberman
Assistant Inspector General
for Auditing

Office of the Inspector General, DoD

Report No. 99-075
(Project No. 8AE-9012)

February 2, 1999

Acquisition of the SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade

Executive Summary

Introduction. The Light Airborne Multipurpose System Mark III (SH-60B) is a computer-integrated, ship and helicopter weapon system that increases the effectiveness of surface combatants by serving as an extension of the sensor and attack systems of the ships to which it is assigned. The Block II Upgrade will greatly enhance helicopter performance in the primary mission areas of anti-submarine warfare and anti-surface warfare. Upon completion of the Block II Upgrade, the helicopter will receive the designation SH-60R. The system is in the engineering and manufacturing development phase of the acquisition process. The SH-60R program office plans to award the low-rate initial production contract for the Block II Upgrade in FY 2000.

Audit Objective. The audit objective was to evaluate the overall management of the SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade Program. Specifically, because the program is in the engineering and manufacturing development acquisition phase, we determined whether management was cost-effectively developing and readying the upgrade for low-rate initial production. In addition, we evaluated the management control program as it related to our audit objective.

Audit Results. Overall, the SH-60R program office was cost-effectively developing and readying the program for low-rate initial production, however, two areas warrant immediate management attention before the program enters low-rate and full-rate production to maintain an effectively managed program.

- o At the July 1993 engineering and manufacturing development decision milestone, the Navy Acquisition Executive (the milestone decision authority) did not inform the program office of the exit criteria that he would use to make the low-rate and full-rate production decisions for the Block II Upgrade. As a result, the program office did not have approved exit criteria to track and measure the program's readiness for the planned low-rate and full-rate production decisions. Without approved exit criteria, the program office also did not complete the exit criteria section of the DoD quarterly defense acquisition executive summary that acquisition officials and the milestone decision authority need to track, manage, and determine system readiness for the planned production decisions (Finding A)

- o The SH-60R program office and the user did not update the program documents that they needed to effectively manage the Block II Upgrade. Program documents, such as the test and evaluation master plan and the operational requirements document, did not reflect current programmatic requirements. Further, the program office did not have a command, control, communications, computer and intelligence support plan to verify that production representative

SH-60R helicopters will perform as required in the intended command, control, communications, computer and intelligence operational environment. As a result, the program manager cannot ensure that planned testing will accurately evaluate the SH-60R program readiness to enter low-rate initial production (Finding B)

Recommendations in this report, if implemented, will improve the management process for the Block II Upgrade and correct the material management control weakness identified in the report (Appendix A).

Summary of Recommendations. We recommend that the Navy Acquisition Executive immediately delineate and approve in writing the exit criteria for the Block II Upgrade low-rate initial production decision to include minimum performance standards for all five upgrade components when they are integrated into the SH-60B helicopter. We also recommend that the SH-60R Program Manager, before the low-rate initial production decision, incorporate live-fire requirements in the test and evaluation master plan, obtain documentation of agreed-upon changes in SH-60R operational requirements from the user; and prepare a command, control, communications, computer, and intelligence support plan.

Management Comments. The Navy agreed to establish exit criteria for the Block II Upgrade low-rate initial production decision. The Navy also agreed to incorporate live-fire requirements in the test and evaluation master plan; obtain documentation of agreed-upon changes in SH-60R operational requirements from the user, and prepare a command, control, communications, computer, and intelligence support plan. See Part I for a summary of management comments to the findings and recommendations and Part III for the complete text of management comments.

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Part I - Audit Results

Audit Background

The Light Airborne Multipurpose System Mark III (SH-60B) is a computer-integrated ship and helicopter weapon system that increases the effectiveness of surface combatants. The SH-60B operates as an extension of the sensor and attack systems in anti-submarine and anti-surface warfare for the ships to which it is assigned. The Block II Upgrade will greatly enhance helicopter performance in the primary mission areas. Upon completion of the upgrade, the upgraded SH-60B, as well as a limited number of SH-60F helicopters, will receive the designation SH-60R. The Block II Upgrade entered the engineering and manufacturing development phase in FY 1993 and is a major avionics modification to the SH-60B and F helicopters. The Block II Upgrade includes the following five major components:

- o Multi-mode radar,
- o Airborne low-frequency sonar acoustic suite,
- o Integrated self-defense suite,
- o Upgraded controls and displays, and
- o Electronic surveillance and support measures system.

Appendix B includes a description of each upgrade component.

The SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade Program (the Block II Upgrade) is a major Defense acquisition program, Acquisition Category IC. The Naval Air Systems Command programmed \$732.9 million for the research and development phase and \$4.5 billion for the production phase of the Block II Upgrade.

On August 17, 1993, the Navy Acquisition Executive (the milestone decision authority) approved the Block II Upgrade to enter the engineering and manufacturing development phase of the acquisition process. The program office plans to award the low-rate initial production contract for the Block II Upgrade in the first quarter of FY 2000 and the full-rate production decision review in the first quarter of FY 2003. The program office will use low-rate initial production units to:

- o provide production configured articles for operational tests,
- o establish an initial production base for the system, and
- o permit an orderly increase in the production rate for the systems.

Audit Objectives

The audit objective was to evaluate the overall management of the Block II Upgrade. Specifically, because the program is in the engineering and manufacturing development acquisition phase, we determined whether the SH-60R program office was cost-effectively developing and readying the upgrade for low-rate initial production. In addition, we evaluated the management control program as it related to our audit objective. Appendix A discusses the audit scope and methodology as well as the management control program review.

SH-60R Program Generally Well Managed

Overall, the program office was cost-effectively developing and readying the program for low-rate initial production. Specifically:

- o In 1995, the program office performed an extensive analysis of Block II Upgrade requirements as established in the operational requirements document, dated August 3, 1992. In the analysis, the program office divided requirements into "shall" and "should" categories. Further, the program office established a detailed database to track how the prime contractor incorporated the operational requirements of the engineering and manufacturing development contract.
- o The program office addressed risk reduction through applying a phased development approach and conducting a comprehensive and integrated developmental test and evaluation program. The program office defined the criteria for probability assessment and impact assessment for performance, supportability, producibility, cost, and schedule in the risk-management plan.
- o The concept "Cost as an Independent Variable" requires acquisition managers to establish aggressive but realistic program objectives to reduce program costs by trading off weapon system performance and schedule requirements with the user's approval. The program office applied this concept for a variety of funding and technological challenges. For example, the program manager decided to divide the engineering and manufacturing development portion of the Block II Upgrade into two distinct phases.

In phase I, the program office emphasized to contractors the requirement to complete the development of component hardware. Through this action, the program office enabled the contractor to proceed on schedule with the airframe redesign.

During phase II, the program manager will direct the contractors to concentrate primarily on software development. By deferring software development to the end of the engineering and manufacturing development phase, the program office will be able to take advantage of the continued development and maturity of related technology.

However, two areas warrant management attention before the program enters low-rate and full-rate production. A discussion of the associated findings follows.

Finding A. Exit Criteria for the Low-Rate and Full-Rate Production Decisions

At the engineering and manufacturing development milestone decision in July 1993, the Navy Acquisition Executive (the milestone decision authority) did not provide the program office with the exit criteria for the Block II Upgrade low-rate and full-rate production decisions. Exit criteria were not available because the milestone decision authority did not document them in the acquisition decision memorandum. As a result, the program office did not have approved exit criteria to track and measure the program's readiness for the planned low-rate and full-rate production decisions. Also, the program office did not complete the exit criteria section of the DoD quarterly defense acquisition executive summary that acquisition officials and the milestone decision authority need to track, manage, and determine system readiness for the planned production decisions of the Block II Upgrade.

Milestone Decisions

Acquisition Procedures and Phases. DoD Regulation 5000 2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System Acquisition Programs (MAIS)," Change 3, March 23, 1998, requires the milestone decision authority to review and approve the readiness of an acquisition program to enter into the next phase of the acquisition process.¹ The four acquisition phases are:

- o Phase 0 Concept Exploration,
- o Phase I Program Definition and Risk Reduction,
- o Phase II Engineering and Manufacturing Development, and
- o Phase III Production, Fielding and Development, and Operation Support.

As specified in the Regulation, the Navy Acquisition Executive is the milestone decision authority at milestone reviews for the Block II Upgrade.

Exit Criteria. DoD Regulation 5000.2-R also requires that program managers propose exit criteria appropriate to the next phase of the program at each milestone review.² At the milestone review, the milestone decision authority is to

¹ DoD Instruction 5000 2, "Defense Acquisition Management Policies and Procedures," February 23, 1991, the predecessor to DoD Regulation 5000 2-R, also required the milestone decision authority to approve entrance into next acquisition phase.

² DoD Instruction 5000 2 required the milestone decision authority to establish program specific exit criteria at the milestone decisions

Finding A. Exit Criteria for the Low-Rate and Full-Rate Production Decisions

approve the proposed exit criteria or to establish exit criteria to track the progress of technical, schedule, and acquisition management risk areas. The milestone decision authority should use the selected exit criteria to serve as benchmarks that demonstrate the program is on track to achieve its final program goals. The program should then be allowed to continue with additional activities within an acquisition phase or continue into the next acquisition phase. The exit criteria demonstrate the level of performance (for example, a level of engine thrust), or level of efficiency (for example, manufacturing yield) or successful accomplishment of an event (for example, first flight) or other criteria that indicate the program is progressing satisfactorily. The Regulation further requires the milestone decision authority to document the exit criteria in an acquisition decision memorandum and requires the program manager to report the program status against the exit criteria in the DoD quarterly defense acquisition executive summary report. The DoD quarterly defense acquisition executive summary report highlights potential and actual program problems to the Under Secretary of Defense for Acquisition and Technology and the milestone decision authority before they become significant.

Proposed Exit Criteria

Program Manager Proposal. At the July 1993 engineering and manufacturing development decision milestone, the program manager proposed exit criteria to the Navy Acquisition Executive for the low-rate initial production and the full-rate production decisions that were planned for the second quarter of FY 2000 and the first quarter of FY 2003, respectively.

For the low-rate initial production, the program manager originally proposed exit criteria that defined requirements, such as the maximum gross take-off weight of the helicopter, the minimum performance of the multi-mode radar, the electronic surveillance and support measures system, and the airborne low-frequency sonar acoustic suite. The program manager also proposed exit criteria for the full-rate production decision that included the program's meeting critical performance, reliability, and maintainability parameters established in the test and evaluation master plan, and completing an operational test and evaluation with a recommendation for limited fleet introduction.

Adequacy of Proposed Exit Criteria. The program manager should have included in the proposed exit criteria the minimum performance standards that all five components of the Block II Upgrade must meet when integrated in the SH-60 helicopter. The program manager did not propose exit criteria for the integrated self-defense suite, the upgraded controls and displays, and all modes of the multi-mode radar. Moreover, the Program Executive Officer (Air, Anti-Submarine Warfare, and Assault and Special Mission Programs) adjusted the program manager's proposed exit criteria on October 4, 1995, by removing minimum performance standards for the electronic surveillance and support measures system. Accordingly, the program manager's proposed exit criteria for the low-rate initial production decision would not fully demonstrate that the program was on track and should continue in the engineering and manufacturing development phase of the acquisition process.

Finding A. Exit Criteria for the Low-Rate and Full-Rate Production Decisions

The full-rate production exit criteria proposed by the program manager required that the Commander, Operational Test and Evaluation Force, perform an operational test and evaluation of the Block II Upgrade and recommend limited fleet introduction. The exit criteria also required the Block II Upgrade to meet the critical performance, reliability, and maintainability parameters established in the test and evaluation master plan. The exit criteria were appropriate, assuming that the parameters in the test and evaluation master plan reflect the current operational requirements.

Milestone Decision Authority Action. In the acquisition decision memorandum dated August 17, 1993, the Navy Acquisition Executive approved the program to enter into the engineering and manufacturing development phase, but he did not document the exit criteria for the low-rate and full-rate production decisions as required in DoD Regulation 5000.2-R.

The Office of the Navy Acquisition Executive stated that, although the acquisition decision memorandum did not document the exit criteria, the milestone decision authority implicitly approved the SH-60R program manager's proposed exit criteria because the Navy Acquisition Executive/milestone decision authority did not specifically take exception to those proposed for the production decisions.

However, the Program Executive Officer (Air, Anti-Submarine Warfare, Assault and Special Mission Programs) and the SH-60R Program Manager did not agree. They believed that the milestone decision authority had not approved the program manager's proposed exit criteria because the milestone decision authority had not documented them in the acquisition decision memorandum.

DoD Quarterly Defense Acquisition Executive Summary Report. Because of this misunderstanding, the program office did not identify the exit criteria and report progress made in the DoD quarterly defense acquisition executive summary report. DoD acquisition officials and the milestone decision authority did not ask why the program office did not include the status of exit criteria in the DoD quarterly defense acquisition executive summary report as required in DoD Regulation 5000.2-R. As a result, the program office did not provide DoD acquisition officials and the milestone decision authority with the information needed to track, manage, and determine the readiness of the Block II Upgrade for the planned production decisions.

Conclusion. The Navy Acquisition Executive did not document the exit criteria in the acquisition decision memorandum. At a minimum, before exit criteria approval, the milestone decision authority should revise the program manager's proposed exit criteria for the low-rate initial production to include minimum performance standards for all five upgrade components when they are integrated into the SH-60B helicopter. The program manager's proposed exit criteria for the full-rate production decision are acceptable for the milestone decision authority approval.

Without documented exit criteria in the acquisition decision memorandum, the program office did not know how DoD managers and the milestone decision authority would track and measure the program's readiness for the planned

Finding A. Exit Criteria for the Low-Rate and Full-Rate Production Decisions

low-rate and full-rate production decisions. As a result, the program office did not provide status reporting on exit criteria in the DoD quarterly defense acquisition executive summary report

Recommendations and Management Comments

A.1. We recommend that the Navy Acquisition Executive:

a. Immediately delineate and approve, in writing, the exit criteria for the Block II Upgrade low-rate initial production decision. The exit criteria should include the minimum performance standards for all five upgrade components when they are integrated in the SH-60 helicopter.

b. Approve, in writing, the program manager's proposed exit criteria for the Block II Upgrade full-rate production decision.

Management Comments. The Navy concurred, stating that the Navy's Senior Acquisition Executive would implement the recommendation by March 1999

A.2. We recommend that the Program Manager, SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade, begin reporting the status of approved exit criteria in the next DoD quarterly Defense acquisition executive summary.

Management Comments. The Navy concurred, stating that once the exit criteria were approved, the program manager would implement the recommendations. The estimated completion date is the third quarter of FY 1999

Finding B. Program Documentation

The SH-60R program office and the user did not update the program documents needed to effectively manage the Block II Upgrade Program documents, such as the test and evaluation master plan and the operational requirements document, did not reflect current programmatic requirements. Specifically, the program manager did not include live-fire requirements in the test and evaluation master plan, and the user did not revise the operational requirements document to reflect changes that the user negotiated with the program manager. The program manager did not update the test and evaluation master plan because he did not agree with the need for live-fire test and evaluation. Also, the user did not revise the requirements document because the user anticipated additional changes and decided to incorporate all changes at the next milestone decision. Further, the program office had not prepared a command, control, communications, computer and intelligence (C⁴I) support plan to verify that production representative SH-60R helicopters would perform as required in the intended C⁴I operational environment. The program office had not prepared a C⁴I support plan because DoD established the requirement for the plan after the Block II Upgrade entered the engineering and manufacturing development phase of the acquisition process. As a result, the program manager cannot ensure through updated documentation that planned testing will effectively evaluate the readiness of the SH-60R program to enter low-rate initial production.

Acquisition Documents

DoD Directive 5000.1, "Defense Acquisition" March 15, 1996, establishes a disciplined management approach for defense acquisition, and DoD Regulation 5000 2-R establishes mandatory procedures for major programs. As part of the disciplined management approach, defense acquisition program managers are to rely on and generate program documents needed for program execution and decisionmaking. Program documents include the operational requirements document, the test and evaluation master plan, and the C⁴I support plan. These interrelated documents help the program manager to provide decisionmakers with the information needed to make important program decisions.

Test and Evaluation Master Plan. The test and evaluation master plan (master plan) documents the overall structure and objectives of the test and evaluation program. The master plan provides a framework to generate detailed test and evaluation plans for tests that the program office requires before key decision points. The master plan should identify the necessary developmental test and evaluation, operational test and evaluation, and live-fire test and evaluation activities. The master plan also should relate program schedule, test management strategy and structure, and required resources to objectives and thresholds derived from the operational requirements document. DoD Regulation 5000 2-R requires program managers to initially submit an approved master plan to the milestone decision authority at the program definition and risk reduction milestone decision. The Regulation also requires the program managers to update the master plans at

later milestone decision points, when a breach of program baselines occurs, or when the acquisition program changes significantly. Within the DoD, the Director, Operational Test and Evaluation, and the Director, Test Systems Engineering and Evaluation, approve master plans for major acquisition programs

Operational Requirements Document. The user develops operational requirements based on validated needs to address mission area deficiencies, evolving threats, and emerging technologies or weapon system improvements. Operational requirements are the foundation for weapon system unique specifications and contract requirements. Beginning at the program definition and risk reduction milestone decision, the user prepares an initial operational requirements document to define the system capabilities that are necessary to satisfy the mission need. The operational requirements document should identify operational performance parameters and show system-level performance capabilities, such as range, probability of kill, platform survivability, and operational availability. The user should establish objectives for each operational performance parameter that represent a measurable, beneficial increment in operational capability. The Service Chief of Staff approves the operational requirements document before each program milestone decision to enable the milestone decision authority to review documentation submitted by the program office, such as program baselines, specifications, and test and evaluation master plans

C⁴I Support Plan. DoD Regulation 5000.2-R requires program managers to prepare a C⁴I support plan for all weapon systems that interface with C⁴I systems. The C⁴I support plan should identify any shortfalls for each phase of the system's life cycle. The plan is used to resolve impediments to the successful life-cycle activities for the system. The program manager includes in the C⁴I support plan the system description, employment concept, operational support requirements, interoperability and connectivity characteristics, management, and scheduling concerns. Further, program managers are to

- o diagram the plan to support the system's developmental and operational test and evaluation, and

- o identify all C⁴I infrastructure necessary for realistic test and evaluation.

The program manager should review and update the C⁴I support plan as necessary at every milestone decision point and whenever the concept of operations or intelligence requirements change.

Status of Program Documents

Master Plan. DoD and Navy officials approved the master plan for the Block II Upgrade on January 6, 1994. At that time, the master plan reflected known developmental and operational testing requirements

Live-Fire Test and Evaluation. The Block II Upgrade master plan states that the Office of the Director, Operational Test and Evaluation, has reviewed the

Finding B. Program Documentation

upgrade changes to the basic helicopter, and that the helicopter has "been found not to require additional live-fire testing at this time." On further analysis of the cumulative effects of the Block II Upgrade modifications, the Director, Operational Test and Evaluation, revised his position on March 3, 1995, and informed the Navy Acquisition Executive and the program manager that the Navy should prepare an alternate live-fire test plan. As of October 1998, however, the program manager had not updated the master plan because the program office did not agree with the need for live-fire test and evaluation. Specifically, the program office asserted that it did not need additional live-fire testing because of the extensive testing performed on earlier versions of the helicopter.

Without including live-fire test and evaluation requirements in the master plan, the program office increases the risk that sufficient live-fire test and evaluation results will not be available before the program full-rate production decision. If the results are not available, it will cause a delay in the full-rate production decision, slip the release of the system to the user, and increase the program costs.

Different Versions of the Approved Master Plans. The program office had two different approved versions of the master plan. The master plans contained different minimally acceptable operational requirements for assessing the effectiveness of the Block II Upgrade in specific mission scenarios. Both master plans are dated January 6, 1994, and include signature pages that lead users to believe that both versions are authentic. The program office was unable to explain why it had two master plan versions and could not provide authoritative documentation showing which master plan was correct. Test and evaluation personnel stated that they were using the master plan that the program office believed was the correct one. Using a wrong master plan could result in test personnel not assessing the Block II Upgrade component performance against the approved minimally acceptable operational requirements.

Operational Requirements Document. The user had not updated the operational requirements document for the Block II Upgrade, dated August 3, 1992, with agreed-upon changes. Since August 1992, the program manager had coordinated requirements changes with the user, who had agreed to delete the tactical data transfer and embedded training requirements from the operational requirements document. Accordingly, the program manager deleted the contract requirements in contract specification revision G, October 8, 1997. The program manager reported the requirements change in the DoD quarterly defense acquisition executive summary for the first quarter of FY 1998. Because the user anticipated additional changes to the operational requirements, he decided not to process a formal change to the operational requirements document until the next milestone decision that the program office scheduled for the first quarter of FY 2003. Further, the program manager did not follow up with the user to obtain written confirmation of the agreed-upon requirements deletions. Accordingly, developmental and operational testers were still basing their test criteria on the August 3, 1992, operational requirements document.

C⁴I Support Plan. The program office did not develop a C⁴I support plan. The requirement that weapon system program managers prepare a C⁴I support plan at every milestone decision point did not occur until March 1996, or almost 3 years after the engineering and manufacturing development decision for the Block II Upgrade. DoD regulation did not require the program office to prepare a C⁴I

Finding B. Program Documentation

support plan until the full-rate production decision point planned for the first quarter of FY 2003. As the next milestone decision point is over 3 years away, the program office would be unwise to wait until then to prepare the C⁴I support plan because C⁴I is an integral performance requirement of the SH-60R helicopter.

In November 1996, the program office received a contracted study that emphasized the importance of C⁴I in SH-60R helicopter performance. The study, "Operational Employment Consideration," stated:

The introduction of the SH-60R has the potential to bring a revolutionary change to the C⁴ISR [surveillance and reconnaissance] capabilities of the Joint Task Force or the battlegroup

Because C⁴I is integral to SH-60R helicopter performance, program office preparation of the C⁴I support plan at this point would help to ensure that low-rate and full-rate production units of the SH-60R helicopter will function as required in the intended C⁴I operational environment.

Conclusion. Documentation is the primary means for providing the milestone decision authority, as well as other key managers, with information needed for decisionmaking. The documentation requirement is even more crucial in program office organizations that have a high turnover of key personnel. During the course of the audit, both the user representative and the program manager positions were vacated and replaced. Without accurate and updated program documents, such as the operational requirements document, the master plan, and the C⁴I support plan, the program office cannot ensure that planned testing will address

- o live-fire test and evaluation requirements,
- o approved operational requirements only, and
- o integral interoperability requirements that would be identified in the C⁴I support plan.

Recommendations and Management Comments

B. We recommend that the Program Manager, SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade, complete the following before the low-rate initial production decision:

- 1. Incorporate live-fire test and evaluation requirements in the Block II Upgrade test and evaluation master plan.**

Management Comments. The Navy concurred, stating that the program manager would insert the SH-60R alternative live-fire test and evaluation plans into the Block II Upgrade test and evaluation master plan before the low-rate initial production decision, which is expected to be in the second quarter of FY 2000.

Finding B. Program Documentation

2. Verify that the minimally acceptable operational performance requirements presented in the test and evaluation master plan are accurate.

Management Comments. The Navy concurred, stating that the program manager would implement the recommendation by January 31, 1999.

3. Obtain written confirmation from the user of agreed-upon deletions in Block II Upgrade operational requirements.

Management Comments. The Navy concurred, stating that the program manager would implement the recommendation by February 1999

4. Prepare and implement a command, control, communications, computers, and intelligence support plan for the Block II Upgrade.

Management Comments. The Navy concurred, stating that the program manager would implement the recommendation by February 2000

Part II - Additional Information

Appendix A. Audit Process

Scope

We conducted this audit from February 1998 through October 1998, and reviewed data dated from August 1992 through August 1998. Based on our initial survey results, we focused our review on Block II Upgrade exit criteria, operational requirements, test and evaluation master plan, and C⁴I support plan. We also reviewed management controls related to the audit objective.

DoD-Wide Corporate-Level Government Performance and Results Act Goals. In response to the Government Performance and Results Act, the Department of Defense has established 6 DoD-wide corporate level performance objectives and 14 goals for meeting the objectives. This report pertains to achievement of the following objective and goal:

Objective: Prepare now for an uncertain future

Goal: Pursue a focused modernization effort that maintains U S qualitative superiority in key warfighting capabilities (DoD-3).

General Accounting Office High-Risk Area. The General Accounting Office has identified several high-risk areas in DoD. This report provides coverage of the Defense Weapons Systems Acquisition high-risk area.

Methodology

We conducted this program audit in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD, and accordingly included such tests of management controls as we deemed necessary. We did not use computer-processed data to perform this audit.

Contacts During the Audit. We visited or contacted individuals and organizations within the DoD and contractor locations. Further details are available upon request.

Management Control Program Review

The DoD Directive 5010.38, "Management Control (MC) Program," August 26, 1996, requires DoD managers to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of those controls.

Scope of Review of the Management Control Program. DoD Directive 5000 1, "Defense Acquisition" March 15, 1996, and DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System Acquisition Programs (MAIS)," Change 3, March 23, 1998, require acquisition managers to use program cost, schedule, and performance parameters as control objectives to implement the DoD Directive 5010.38 requirements. Accordingly, we limited our review to management controls directly related to the acquisition of the Block II Upgrade.

Adequacy of Management Controls. We identified a material management control weakness, as defined by DoD Directive 5010 38, for the Block II Upgrade. Management controls were not adequate because the milestone decision authority did not establish exit criteria for the low-rate and full-rate production decisions to serve as benchmarks to demonstrate that the program is on track to achieve its final program goals. A copy of the report will be provided to the senior official responsible for management controls in the Office of the Assistant Secretary of the Navy (Financial Management and Comptroller).

Adequacy of Management's Self-Evaluation. The Naval Air Systems Command did not perform a self-evaluation to identify material management control weaknesses

Summary of Prior Coverage

During the last 5 years, the Inspector General, DoD, and the Naval Audit Service have not issued reports specifically addressing the Block II Upgrade

Appendix B. Description of Block II Upgrade Components

The Block II Upgrade configuration will include baseline capabilities of the SH-60B helicopter and the following five major system additions or modifications

Multi-Mode Radar. The multi-mode radar will possess a variety of operational modes designed to accomplish tasks and functions that are dependent on the mission requirements. The SH-60R helicopter will have long-range, standoff surface vessel target detection and classification with the inverse synthetic aperture radar mode. Specifically, the design of the multi-mode radar will have the following capabilities

- o an auto-classification capability that includes an automatic track-while-scan,
- o a periscope detection mode designed for low-radar, cross-section to expose targets,
- o a growth potential for a synthetic aperture radar ground motion target indicator mode to target forces on the shore or inland to the range of the radar,
- o a limited air-to-air detection and tracking mode to provide early indication and warning to ships of the battlegroup for cruise missiles and "low/slow flyers,"
- o an embedded identification friend-and-foe system to facilitate friendly identification and correlated sensor fusion,
- o a low probability interception system, and
- o a mode specifically for severe weather detection and avoidance

The Block II Upgrade will integrate the multi-mode radar with the aircraft computer's decision support system.

Airborne Low-Frequency Sonar Acoustic Suite. The airborne low-frequency sonar acoustic suite will provide the SH-60R helicopter with long-range acoustic detection of submarines in active and passive modes. The sonar's variety of operating modes will provide excellent detection capability in the shallow water of the littoral environment. Also, the sonar will sample the temperature and pressure of the water column in which it is placed and recommend optimum modes of operation

Integrated Self-Defense Suite. In the intended operating environment of the littorals, the SH-60R helicopter will be exposed to an increased threat risk. The integrated self-defense system, in conjunction with the new weapons-bearing capability, will protect the helicopter and the crew from the littoral threats. The system will also provide threat-identification and radar-warning capability with

Appendix B. Description of Block II Upgrade Components

integrated-countermeasure-dispensing capability. The countermeasures will include chaff and flares. In addition, follow-on development will include directed energy and laser warning detection and countermeasures.

Upgraded Controls and Displays. Upgraded controls and displays consist of the automated flight control system and advanced displays.

Automated Flight Control System. The automated flight control system consists of existing equipment and new Government-furnished equipment. The existing equipment includes the avionics segment, the automated flight control system control panel, and the automated flight control system test panel. The new Government-furnished equipment includes the digital automated flight control system.

Advanced Displays. To accommodate the increased capabilities of the sensor and meet mission objectives, the SH-60R helicopter will have advanced display systems for the flight station and the sensor operator. The flat panel, active matrix liquid crystal displays will contain important tactical system information and provide amplifying information for detected contacts.

Electronic Surveillance and Support Measures System. The electronic surveillance and support measures system will possess an expanded frequency range with an automated onboard library for rapid-emitter detection and identification. The system will display the detected emitter and mode of operation and will accommodate the latest technology emitters, including frequency agile and very complex radiating techniques. In addition to the raw-data information, the Block II Upgrade will integrate this system with the aircraft computer's decision support system.

Appendix C. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
Deputy Chief Financial Officer
Deputy Comptroller (Program/Budget)
Assistant Secretary of Defense (Public Affairs)
Director, Operational Test and Evaluation
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Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Assistant Secretary of the Navy (Research, Development, and Acquisition)
Commander, Naval Air Systems Command
Program Executive Officer, Air, Anti-Submarine Warfare, Assault and Special Mission Programs
Program Manager, SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade
Auditor General, Department of the Navy

Department of the Air Force

Assistant Secretary of the Air Force (Financial Management and Comptroller)
Auditor General, Department of the Air Force

Other Defense Organization

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Office of Management and Budget
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Non-Defense Federal Organizations and Individuals (cont'd)

Chairman and ranking minority member of each of the following congressional committees and subcommittees:

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services
House Committee on Government Reform
House Subcommittee on Government Management, Information, and Technology,
Committee on Government Reform
House Subcommittee on National Security, International Affairs, and Criminal Justice,
Committee on Government Reform

Part III - Management Comments

Department of the Navy Comments



THE ASSISTANT SECRETARY OF THE NAVY
Research Development and Acquisition
1000 Navy Pentagon
Washington DC 20350-1000

JAN 25 1999

MEMORANDUM FOR THE DEPARTMENT OF DEFENSE ASSISTANT INSPECTOR
GENERAL FOR AUDITING

Subj: DODIG DRAFT REPORT ON ACQUISITION OF THE SH-60R LIGHT
AIRBORNE MULTIPURPOSE SYSTEM MARK III BLOCK II UPGRADE
(PROJECT NO. 8AE-9012)

Ref: (a) DODIG memo of 29 Oct 98

Encl: (1) Department of the Navy Response

I am responding to the draft audit report forwarded by reference (a) concerning the Acquisition of the SH-60R Light Airborne Multipurpose System Mark III Block II Upgrade.

The Department of the Navy response is provided at enclosure (1). We concur with recommendations A and B. I will conduct a program review of recommended Low Rate Initial Production (LRIP) and Production exit criteria, which will be incorporated into the quarterly Defense Acquisition Executive Summary (DAES) Report. We believe that Live Fire Test and Evaluation requirements can be met through the analysis of existing Live Fire data and projecting that to SH-60R mission profiles, which are not changing from what today's SH-60 aircraft are flying.

H. LEE BUCHANAN

Copy to:
FMO-31
COMNAVAIRSYSCOM (AIR-8.0G)
DASN(AIR)

DEPARTMENT OF THE NAVY RESPONSE TO
DODIG DRAFT REPORT OF 29 OCTOBER 1998
"ACQUISITION OF THE SH-60R LIGHT AIRBORNE
MULTIPURPOSE SYSTEM MARK III BLOCK II UPGRADE"
(PROJECT NO. 8AE-9012)

Finding A: Exit Criteria for the Low-Rate and Full-Rate Production Decisions

At the engineering and manufacturing development milestone decision in July 1993, the Navy Acquisition Executive (the milestone decision authority) did not provide the program office with the exit criteria for the Block II Upgrade low-rate and full-rate production decisions. Exit criteria were not available because the milestone decision authority did not document them in the acquisition decision memorandum. As a result, the program office did not have approved exit criteria to track and measure the program's readiness for the planned low-rate and full-rate production decisions. Also, the program office did not complete the exit criteria section of the DoD quarterly defense acquisition executive summary that acquisition officials and the milestone decision authority need to track, manage, and determine system readiness for the planned production decisions of the Block II Upgrade.

Recommendation:

A1. We recommend that the Navy Acquisition Executive:

a. Immediately delineate and approve, in writing, the exit criteria for the Block II Upgrade low-rate initial production decision. The exit criteria should include the minimum performance standards for all five upgrade components when they are integrated in the SH-60 helicopter

b. Approve, in writing, the program manager's proposed exit criteria for the Block II Upgrade full-rate production decision

A2. We recommend that the SH-60R Program Manager begin reporting the status of approved exit criteria in the next DoD quarterly defense acquisition executive summary.

DON Response:

A1: Concur. Navy's Senior Acquisition Executive (SAE) will conduct a program review of recommended Low Rate Initial Production (LRIP) and Production exit criteria, including those contained in the program's Integrated Program Summary (IPS). The Navy SAE will then approve the appropriate criteria. The estimated completion date is March 1999.

Enclosure (1)

Department of the Navy Comments

A2: Concur. Once proposed exit criteria are approved, the next quarterly DAES report will address progress towards these criteria. Estimated completion date is third quarter FY99.

Finding B: Program Documentation

The SH-60R program office and the user did not update the program documents needed to effectively manage the Block II Upgrade. Program documents, such as the test and evaluation master plan and the operational requirements document, did not reflect current programmatic requirements. Specifically, the program manager did not include live-fire requirements in the test and evaluation master plan, and the user did not revise the operational requirements document to reflect changes that the user negotiated with the program manager. The program manager did not update the test and evaluation master plan because he did not agree with the need for live-fire test and evaluation. Also, the user did not revise the requirements document because the user anticipated additional changes and decided to incorporate all changes at the next milestone decision. Further, the program office had not prepared a command, control, communications, computer and intelligence (C4I) support plan to verify that production representative SH-60R helicopters would perform as required in the intended C4I operational environment. The program office had not prepared a C4I support plan because DoD established the requirement for the plan after the Block II Upgrade entered the engineering and manufacturing development phase of the acquisition process. As a result, the program manager cannot ensure through updated documentation that planned testing will effectively evaluate the readiness of the SH-60R program to enter low-rate initial production.

DON Comments: Live fire test and evaluation requirements (LFTE) have been tailored into evaluation efforts appropriate for this platform. With joint OSD/Program Office concurrence, analysis of previous H-60 series helicopters test, combat, and evaluation results is being conducted that will most likely supplant the need for additional live fire testing of this H-60 variant.

In using Cost as an Independent Variable (CAIV) processes on a dynamic development program of this magnitude and complexity, it is not uncommon to have CAIV drive changes in the original requirements. That has happened on on this program, and is likely to happen in the future. Approval of changes in program execution and agreement to changes in driving requirements has been accomplished with the sponsors, program office, and prime contractor. Formal documentation of these agreements needs to be done in the future (see response to recommendation B3), but a consistent churning of the ORD has not been envisioned as an efficient method of accomplishing this documentation. The intent of the product team and sponsors was to do a single "omnibus" ORD update just prior to major program events (LRIP approval, TECHEVAL/OPEVAL, MS III).

Enclosure (1)

Recommendation:

B. We recommend that the SH-60R Program Manager, before the low-rate initial production decision:

1. Incorporate live-fire test and evaluation requirements in the Block II Upgrade test and evaluation master plan.

2. Verify that the minimally acceptable operational performance requirements presented in the test and evaluation master plan are accurate.

3. Obtain written confirmation from the user of agreed-upon deletions in Block II Upgrade operational requirements

4. Prepare and implement a command, control, communications, computers and intelligence support plan for the Block II Upgrade

DON Response:

B1: Concur. We believe LFTE requirements can be met by conducting the analysis of existing Live Fire data and projecting that to SH-60R mission profiles, which are not changing from what today's SH-60 are flying. We will continue to monitor the development of the SH-60R alternative LFTE Plan, and pursue any required Full Up Live Fire waivers or legislative relief needed to support the alternative plan. We estimate insertion of SH-60R alternative LFTE plans into the Block II Upgrade Test and Evaluation Master Plan to be complete before the LRIP decision, currently expected in second quarter FY00

B2: Concur. Estimated completion date is January 31, 1999.

B3: Concur. We will create Memorandum for the Record (MFR) as operational requirement changes are agreed upon. We will route this MFR to the Acquisition Coordination Team Members, IPT competency leads and the Prime Contractor to ensure dependent documentation is appropriately annotated. The ORD will be updated and approved prior to the LRIP decision. Estimated Completion dates: MFR by February 1999 and ORD update by February 2000.

B4: Concur. Estimated completion date is February 2000

Enclosure (1)

Audit Team Members

The Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD, produced this report

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